

Tongda Xu

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Apt 1507, 62 Xinwenhua St, Xicheng Dist, Beijing

EDUCATION

New York University

Master of Science in Digital Media, GPA: 3.85/4.0, Advised by Dr. Wang Yao

New York, US

Sep 2018 - Dec 2020

- **Awards:** Graduate Fellowship, Graduate Research Fellowship
- **Relevant Coursework:** Image and Video Processing, Machine Learning, Probability and Stochastic Process, Optimization and Numerical Linear Algebra, Data Structure and Algorithm, Computer System Architecture
- **Thesis:** Accelerating Crowd Volunteer Audio Description Production with Content Recommendation

Tsinghua University

Bachelor of Architecture, GPA: 3.82/4.0, Advised by Dr. Huang Weixin

Beijing, China

Aug 2013 - May 2018

- **Awards:** National Fellowship, Tsinghua-Nitianzeng Fellowship, Academic Excellence Fellowship × 2
- **Relevant Coursework:** Calculus, Computer Graphics
- **Thesis:** Mediating People's EEG Alpha Band Power through Reinforcement Learning

EXPERIENCE

Institute for AI Industry Research (AIR), Tsinghua University

Research Assistant (Neural Codec), Advised by Dr. Wang Yan

Beijing, China

June 2022 - Present

- **Bit-allocation using Optimization :** Prove the equivalence between optimal bit allocation for video codec via semi-amortized variational inference. Under review.

Sensetime Research

Researcher (Codec Group), Advised by Dr. Wang Yan

Beijing, China

Jan 2021 - June 2022

- **Semi-amortized Inference for Variable Bitrate Image Compression:** Propose an approach to achieves variable bitrate model and perception-distortion trade-off in neural image compression using semi-amortized variational inference. Published in NeurIPS 2022 [c6].
- **Importance Weighted Neural Image Compression:** We propose an approach for neural image compression training with tighter ELBO. Published in NeurIPS 2022 [c5].
- **Spatial Moment Pooling for Blind Image Quality Assessment:** Propose to extent spatial average pooling into spatial moment pooling by incorporating higher order moments. Published in ICIP 2022 [c4].
- **Compressed Domain Contour Flow for Fast Video Salient Detection:** Propose a novel contour-flow approach for P/B frame salient object detection by wrapping the I frame contours with motion vectors encoded in bitstream. The boundary problem of feature-flow approaches is overcame by wrapping contours directly. Achieve 400% speed up with 3% f-measure loss compared with SOTA.

Microsoft Research Asia (MSRA)

Research Intern (Media Computing Group), Excellent Intern, Advised by Dr. Li Bin

Beijing, China

Jan 2020 - Dec 2020

- **Joint Rate Control for Real-time Communication with Reinforcement Learning:** Propose and implement a deep reinforcement learning based framework for joint rate control of multiple sources in real-time communication. Outperform WebRTC + VP8 in screen and video sharing scenario by 0.5db in PSNR.
- **Fluid Screen Sharing:** Propose and implement a mixed-integer linear programming based algorithm for screen content re-layout. Facilitate real-time relaying out for screen sharing across different devices.
- **Error Recovery for Video Communication:** Dive in, implement and evaluate core video error recovery algorithm including Hybrid Type I, WebRTC and Microsoft in-house RTC.

Video Lab, New York University

Research Intern (Image Processing), Advised by Dr. Wang Yao

New York, US

May 2019 - Aug 2019

- **Optimal Feature Subset Selection for MRI:** Propose a novel improvement of A* heuristic search for feature selection, combining the idea of A* graph search and genetic algorithm, improved state of the art of problem by 0.2 in r2 score for regression.
- **Image Cascade Network for Large 3D Medical Image Segmentation:** Propose and implement an end-to-end auto-context based multi-level network structure enabling semantic segmentation for 3D image as large as 256³. Achieve dice coefficient 0.99 for background, 0.92 for mouse embryo and 0.85 for brain vehicle.

Aedas Ltd (HK Office)

Architecture Intern, Advised by Christine Lam and David Clayton

Hong Kong, China

May 2017 - Aug 2017

- **Computer-Aided Design Toolkit:** Optimize working pipeline and accelerate design, calculation and analysis process from feasibility study to construction for 6 complex buildings in China. Compile a computational toolkit with C# in Grasshopper, facilitating building codes calculation and parametric curtain wall design.

X-Studio, Tsinghua University

Research Intern (Human-Computer Interaction), Advised by Dr. Mi Haipeng

Beijing, China

May 2015 - Aug 2015

- **Tangible Circuit Training:** Aid design and implement of a table based tangible user interface application simulating circuits and electric components. Aid graphic and interface programming in Java.

TEACHING

DM-UY 1143 - Ideation & Prototyping, New York University

Teaching Assistant to Ideation and Prototyping of Benedetta Piantella

New York, US

Sep 2018 - Jan 2019

Architecture Design Studio 6 - Parametric Design , Tsinghua University

Teaching Assistant to Parametric Design studio of Dr. Weixin Huang

New York, US

May 2015 - Aug 2015

PUBLICATIONS

- [c6]: Gao, C.*, Xu, T*., He, D., Wang, Y., Qin, H. (2022). Flexible Neural Image Compression via Code Editing. Advances in Neural Information Processing Systems. (NeurIPS) (*equal contribution)
- [c5]: Xu, T., Wang, Y., He, D., Gao, C., Gao, H., Liu, K. Qin, H. (2022). Multiple-sample Neural Image Compression. Advances in Neural Information Processing Systems. (NeurIPS)
- [c4]: Xu, T., Shao, Y., Wang, Y., & Qin, H. (2022). Spatial Moment Pooling Improves Neural Image Assessment. In 2021 IEEE International Conference on Image Processing (ICIP). IEEE.
- [c3]: He, D., Yang, Z., Yu, H., Xu, T., Luo, J., Chen, Y., ... & Wang, Y. (2022). PO-ELIC: Perception-Oriented Efficient Learned Image Coding. In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshop (pp. 1764-1769).
- [j1]: Qiu, Z., Xu, T., Langerman, J., Das, W., Wang, C., Nair, N., ... & Wang, Y. (2021). A Deep Learning Approach for Segmentation, Classification and Visualization of 3D High Frequency Ultrasound Images of Mouse Embryos. IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control.
- [c2]: Xu, T*, Qiu, Z.*, Das, W., Wang, C., Langerman, J., Nair, N., ... & Wang, Y. (2020, April). Deep Mouse: An End-to-End Auto-Context Refinement Framework for Brain Ventricle & Body Segmentation in Embryonic Mice Ultrasound Volumes. In 2020 IEEE 17th International Symposium on Biomedical Imaging (ISBI) (pp. 122-126). IEEE. (*equal contribution)
- [c1]: Xu, T., Wang, D., & You, X. (2018, October). Mindgame: Mediating People's EEG Alpha Band Power through Reinforcement Learning. In The 31st Annual ACM Symposium on User Interface Software and Technology Adjunct Proceedings (pp. 5-6). ACM

COMMUNITY SERVICE

- **Program Committee / Reviewer:** NIPS 2023, CVPR 2023, ICCV 2023, ICASSP 2023

PATENTS

- [processing]: Xu, T., Gao, C., Wang, Y., Yuan, T., & Qin, H.(2021). Video Saliency Detection in Compressed Domain.
- [processing]: Xu, T., Yuan, T., Shao, Y., Wang, Y., & Qin, H.(2021). Video Restoration based on Error Estimation.
- [CN113660531A]: Xu, T., Gao, C., Wang, Y., Yuan, T., & Qin, H.(2021). Multi-scale Shifted Statistics for Adaptive Quantization.
- [CN113612999A]: Xu, T., Gao, C., Wang, Y., Yuan, T., & Qin, H.(2021). Real-time Saliency Detection for Adaptive Quantization.